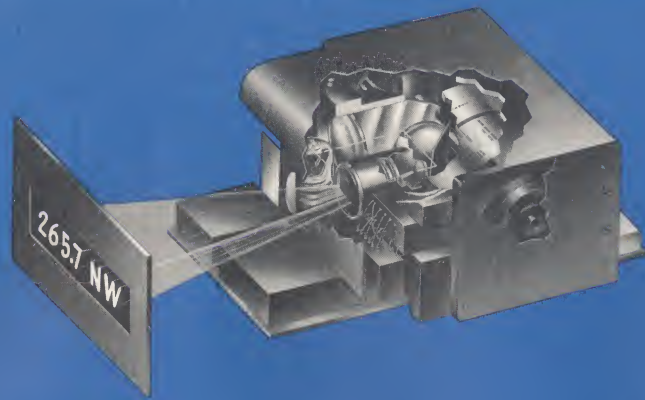




**A COMPLETE
INTEGRATED
READOUT SUBSYSTEM,
INCLUDING DECODING,
DRIVING, & DISPLAY
FUNCTIONS, FOR
UNDER \$40
PER COLUMN...**

RAYTHEON

OPTIONS

- COLORED BACKGROUNDS
- COLORED CHARACTERS
- FLOATING DECIMAL POINT
- 4-2-2-1 AND 2-OUT-OF-5 CODES
- MOUNTING CONFIGURATIONS
- NON-STANDARD CHARACTERS
- INTEGRAL HIGH-SPEED MEMORY
- CHOICE OF CHARACTER SIZE

The simple design of the Datastrobe subsystem, which uses a character mask on a rotating drum, allows the system designer to display information to specifications. The Datastrobe is a complete digital readout subsystem — including decoding, driving, display functions — *fully assembled, tested and ready to use*. And the cost is low, too — less than \$40 per column in quantities.

Besides the usual options — floating decimal point, polarity, special mounting, special codes, etc. — the standard Datastrobe permits, with a custom mask, features not found in other readouts. Symbols and characters of any language and in any type face can be displayed.

Individual characters or the entire display background can be colored for warnings, special indications, etc. Also word messages can be displayed since there are no separations between the columns.

In addition to visual readout, the Datastrobe subsystem can be used as a high-speed optical printer. The light output from a single flash is sufficient to expose direct readout, dry-process materials, such as linograph paper or xerox plate.



SIGNAL WITH COLOR

3

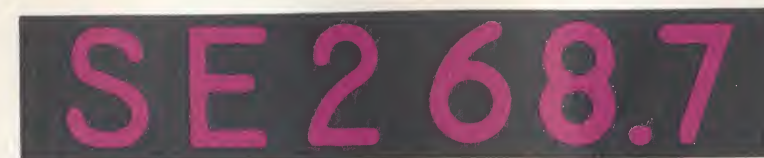
The Datastrobe permits the use of color for any functional purpose you require — danger warning, overload indication, change of trend, signal for maintenance. There are many color combinations possible. Up to six separate colored background configurations are available. Individual characters, too, can be in color; colored characters can be displayed simultaneously with regular white-on-black.



Background fully colored



Background for columns 4, 5 and 6 colored



Colored fonts



Colored fonts alongside regular white-on-black

MESSAGES COME EASY

Datastrobe is ideal for displaying messages because information is rear-projected, without separations between columns. One six-column unit, the EM1, can *display up to 60 separate messages*, each of 30 or more character length. And, of course, shorter messages can be displayed simultaneously with numeric readout. Shown below are some sample messages.

SOME OF THE MANY POSSIBLE PRESENTATIONS AND DESCRIPTION OF DISPLAYS



5-column numeric, 10 single-column symbols



10 single-column symbols, 5-column numeric



3-column numeric, up to 30 triple-column messages



4-column numeric with floating decimal point, up to 20 double-column messages

Alternating full-screen message and numeric readout.



.... Up to 10 messages while numerics inhibited.



.... Normal 5-column display with messages inhibited.



3-columns of numerals, up to 30 triple column messages



Up to 20 double-column messages, 4-column numerics



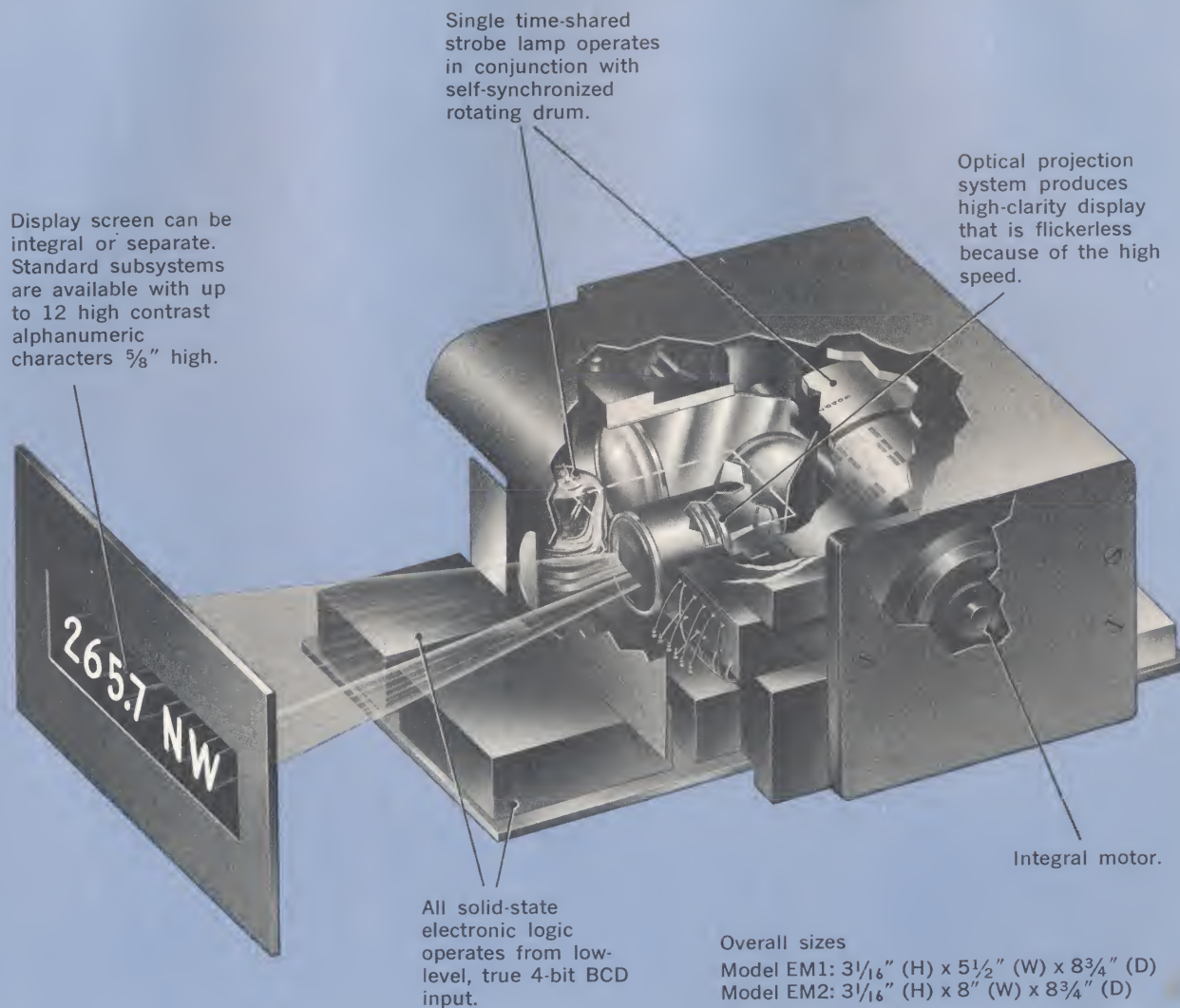
Blank spaces can be provided as needed.



Up to 40 quadruple-column messages, 2-column numerics

FEATURES

- COMPLETE SYSTEM
- FULLY TESTED
- SINGLE TIME-SHARED SOURCE OF ILLUMINATION
- LOW COST
- SUPERIOR READABILITY
Bright, White-on-Black
Sharp, Precise Registration
High Contrast
Single Plane
Fully Formed
- MESSAGE DISPLAYS
- ALPHANUMERICS
- LOW-LEVEL INPUT COMPATIBLE WITH INTEGRATED CIRCUITS
- HIGH SYSTEM RELIABILITY
Solid State Electronics
Time-Shared Logic
Direct Comparison Decoding
4-Line 8-4-2-1 BCD Input



VERSATILE MODULAR DISPLAY

5 Datastrobe's optical system allows various subsystem configurations. This allows greater flexibility for solving unusual packaging problems. Further depth reduction is possible by optical mirrors which fold the projection throw between lens and screen.



Right angle vertical mount $3\frac{1}{8}$ " deep



Right angle side mount $5\frac{1}{4}$ " deep



Vertical angle mount.

DISPLAY ANY LANGUAGE

Datastrobe readouts can be in any language you desire — French, Arabic, German, Japanese. Also in any type face. This includes MIL MS 33558 (ASG) and any other gothic or any serif font you choose.

SEE FOR YOURSELF.

For a free demonstration in your office, contact your nearest Raytheon Regional Sales Office. Or, if you prefer, use the attached postage-paid reply card.

6

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Permit No. 35508
Lexington, Mass.

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NO POSTAGE STAMP NECESSARY IF MAILED IN UNITED STATES

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COMPONENTS DIVISION

Dept. 2011

141 Spring Street

Lexington, Mass. 02173



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FILL OUT FOR DATASTROBE DISPLAY DEMONSTRATION

For a demonstration in your office mail this card.

- ☐ I am interested in a demonstration of Datastrobe Display Subsystem
- ☐ Please send technical literature

Name _____

Title _____ Dept. or Div. _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone: Area Code _____ Number _____ Ext. _____

My interest concerns:

- ☐ A Specific Present Application for _____
Column Display*
- ☐ A Possible Future Application for _____
Column Display*
- ☐ Message Capability
- ☐ Color Display
- ☐ Other _____

(Please explain)

on:

- ☐ Prototype Equipment or System Design
- ☐ New Equipment or System for Production
- ☐ Modification or Redesign of Existing Equipment or System
- ☐ Substitution for Similar Type Product

*Please specify the number of columns to be displayed.

PRODUCT SPECIFICATIONS

RAYTHEON

DATASTROBE ALPHA-NUMERIC DIGITAL READOUT SUBSYSTEM

**SERIES EM5
SERIES EM6**



- High-contrast flickerless display
- Standard units for up to 6 characters
- Integral or separate display screen

- Compatible with integrated circuitry
- All solid-state electronic logic
- Includes decoding, driving and display functions.

The Datastrobe self-decoding readout subsystem displays conventional-form, in-line, in-plane, white-on-black characters of high contrast for easy reading. Utilizing an advanced concept for the readout of digital signals, a high standard of reliability is attained at low cost.

The Datastrobe character generator uses a single, time-shared, high-speed Xenon strobe flash lamp in conjunction with a single, high-quality optical system and a character mask affixed to a rotating drum to produce a high-clarity, multiple-column display with precise registration. The all-solid-state electronic logic operates from low-level, true 6-bit code that does not require complementary input. A time-shared, self-decoding method, which uses direct-comparison logic, excludes any possibility of ambiguous readout.

The fully assembled and tested Datastrobe system, except for power supply, is complete including decoding, driving, and display functions. It wires directly to logic without buffers or drivers. The display screen, normally integral, can be mounted separately for console use, thus requiring the least panel space of any readout. While 1/2-inch high

characters are normally supplied, characters of any size up to 1 inch are available.

Overall system reliability is enhanced by direct-comparison decoding and the reduced number of components. No auxiliary decoders, no inverters, no amplifiers, nor set-pulse signals are required. Erroneous readouts caused by segmental failures cannot occur as the Datastrobe subsystem has fully formed characters. Further, no switches, no relays, no slide plates, nor other intermittent-motion mechanisms are used. The all-solid-state logic is fully compatible with integrated circuits.

Standard Datastrobe alpha-numeric readouts are available in two series: the EM5 series capable of displaying up to three letters and the EM6 series from four to six letters. The EM6 series has a second strobe lamp, character mask, and optical system which in effect is paralleled to those of the EM5.

MODEL IDENTIFICATION

EM5-2	2 characters	EM6-4	4 characters
EM5-3	3 characters	EM6-5	5 characters
		EM6-6	6 characters

SPECIFICATIONS

Power requirements:

1. Motor: nominal 115 volts, 60 c.p.s. at 7 watts.
2. Flash tube and trigger circuit: 300 to 400 dc volts max., variable for control of brilliance. 40 mAdc max. for EM5 series, 80 mAdc max. for EM6 series.
3. Bias (regulated supply): +11 to +13 Vdc at 50 mAdc nominal for EM5, at 100 mAdc nominal for EM6. -11 to -13 Vdc at 30 mAdc nominal for EM5 series, at 60 mAdc nominal for EM6 series.

(While absolute values of bias are not critical magnitude of negative and positive values should be held within 1/2 volt.)

Signal Inputs:

Nominal negative logic signal levels required are:

Logic 1 = 0 volts (operates -4V to +0.4v);
maximum current per bit less than 1 ma.

Logic 0 = +2 volts or open circuit. (Operates +1.0v to +6v max.); no current drawn.

Truth table:

Character displayed	6-line 32-16-8-4-2-1	Character displayed	6-line 32-16-8-4-2-1
0	0 0 0 0 0 0	5	0 0 0 1 0 1
1	0 0 0 0 0 1	6	0 0 0 1 1 0
2	0 0 0 0 1 0	7	0 0 0 1 1 1
3	0 0 0 0 1 1	8	0 0 1 0 0 0
4	0 0 0 1 0 0	9	0 0 1 0 0 1
A	1 0 0 0 0 0	N	1 0 1 1 0 1
B	1 0 0 0 0 1	O	1 0 1 1 1 0
C	1 0 0 0 1 0	P	1 0 1 1 1 1
D	1 0 0 0 1 1	Q	1 1 0 0 0 0
E	1 0 0 1 0 0	R	1 1 0 0 0 1
F	1 0 0 1 0 1	S	1 1 0 0 1 0
G	1 0 0 1 1 0	T	1 1 0 0 1 1
H	1 0 0 1 1 1	U	1 1 0 1 0 0
I	1 0 1 0 0 0	V	1 1 0 1 0 1
J	1 0 1 0 0 1	W	1 1 0 1 1 0
K	1 0 1 0 1 0	X	1 1 0 1 1 1
L	1 0 1 0 1 1	Y	1 1 1 0 0 0
M	1 0 1 1 0 0	Z	1 1 1 0 0 1

Viewing angle: 80° from normal (160° total angle).

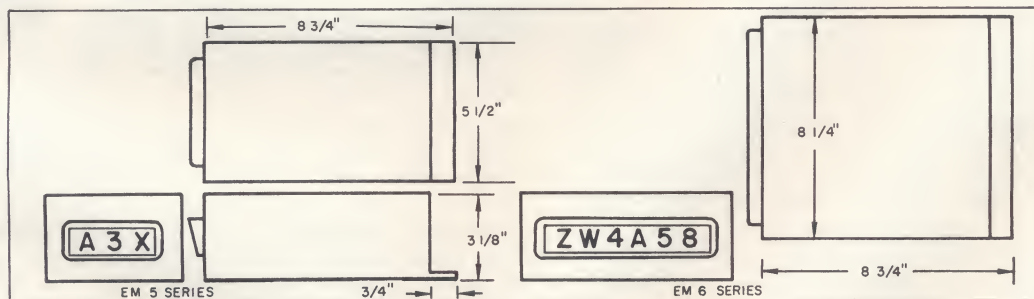
Transition Time:	22 milliseconds*
Characters:	Fully-formed conventional style 1/2 inch per military standard MS33558 (ASG)
Character brilliance:	50 to 70 footlamberts at maximum intensity.
Terminal connections:	CTS 1018-2 42 terminal solder-type strip at rear of character generator.
Motor:	Nominal 2600 r.p.m. split-phase precision induction equipped with permanently-lubricated type R4 ball bearings loaded very conservatively for life in excess of 200,000 hours.
Strobe tube life expectancy:	5000 hours minimum for 50% reduction in light output. Each tube is pre-aged to eliminate any early-hours failure caused by latent manufacturing defects.
Case:	Black matte finish 3-1/8" high x 8-3/4" deep. Width 5-1/2" for EM5, 8-1/4" for EM6 series.
Weights:	For EM5 series 6.0 lbs. actual, 7.5 lbs. approximate packed for shipment. For EM6 series 7.5 lbs. actual, 9.5 lbs. approximate packed for shipment.

*Time required to go from one complete display to the next display.

Note: Inputs may be switched at megacycle rates without limitation by Datastrobe unit.

WARRANTY

In general, Datastrobe Digital Display Devices carry a 1-year warranty against defects in material and workmanship, except for the flash tube. Devices proving to be defective within the warranty period will be repaired or replaced. This warranty is exclusive, and in no event will Raytheon be responsible for special or consequential damages. Details of this warranty accompany the equipment.



OPTIONS AND ACCESSORIES

Floating or fixed decimal point
Letter sizes 1/4, 3/8, 5/8, 3/4 and 1 inch in height
Positive logic input capability
Memory: integral high-speed electronic memory
Flash tube power supply
High-contrast viewing screen
Extra wide angle viewing screen
Projection model for console mounting (supplied less bezel and screen but including protective enclosure)

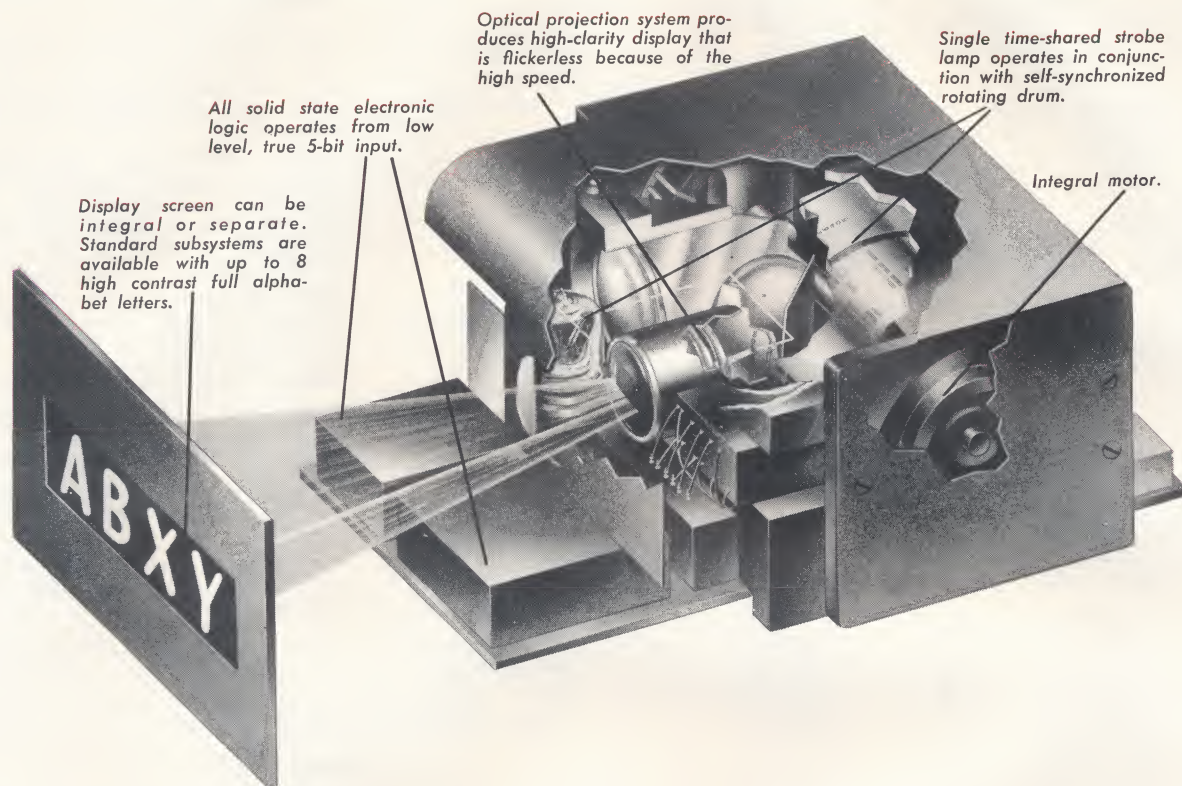
SPECIAL ORDER ITEMS

Displays less than 1/4 and greater than 1 inch in height
Symbols in place of letters or numerals
Custom style characters
Other digital codes
Mating connector for quick disconnect
Grouping and displacement of display columns
50 c.p.s. and special voltage motors

PRODUCT SPECIFICATIONS

RAYTHEON

DATASTROBE FULL-ALPHABET READOUT, EM3 AND EM4



The Datastrobe self-decoding readout subsystem displays conventional-form, in-line, in-plane, white-on-black characters of high contrast for easy reading. Utilizing an advanced concept for the readout of digital signals, a high standard of reliability is attained at low cost.

The Datastrobe character generator uses a single, time-shared, high-speed Xenon strobe flash lamp in conjunction with a single, high-quality optical system and a character mask affixed to a rotating drum to produce a high-clarity, multiple-column display with precise registration. The all-solid-state electronic logic operates from low-level, true 5-bit code that does not require complementary input. A time-shared, self-decoding method, which uses direct-comparison logic, excludes any possibility of ambiguous readout.

The fully assembled and tested Datastrobe system, except for power supply, is complete including decoding, driving, and display functions. It wires directly to logic without buffers or drivers. The display screen, normally integral, can be mounted separately for console use, thus requiring the least

panel space of any readout. While $\frac{1}{2}$ -inch letters are normally supplied, characters of any size up to 1 inch high are available.

Overall system reliability is enhanced by direct-comparison decoding and the reduced number of components. No auxiliary decoders, no inverters, no amplifiers, nor set-pulse signals are required. Erroneous readouts caused by segmental failures cannot occur as the Datastrobe subsystem has fully formed characters. Further, no switches, no relays, no slide plates, nor other intermittent-motion mechanisms are used. The all-solid-state logic is fully compatible with integrated circuits.

Standard Datastrobe alphabetic readouts are available in two series: the EM3 series capable of displaying up to four letters and the EM4 series from five to eight letters. The EM4 series has a second strobe lamp, character mask, and optical system which in effect is paralleled to those of the EM3.

MODEL IDENTIFICATION

EM3-2	2 letters	EM4-5	5 letters
EM3-3	3 letters	EM4-6	6 letters
EM3-4	4 letters	EM4-7	7 letters
		EM4-8	8 letters

COMPONENTS DIVISION, INDUSTRIAL COMPONENTS OPERATION, 465 CENTRE STREET, QUINCY, MASS. 02169

SPECIFICATIONS

Power requirements:

1. Motor: nominal 115 volts, 60 c.p.s. at 7 watts.
2. Flash tube and trigger circuit: 300 to 400 dc volts max., variable for control of brilliance. 40 mAdc max. for EM3 series, 80 mAdc max. for EM4 series.
3. Bias (regulated supply): +11 to +13 Vdc at 50 mAdc nominal for EM3, at 100 mAdc nominal for EM4. -11 to -13 Vdc at 30 mAdc nominal for EM3 series, at 60 mAdc nominal for EM4 series.

(While absolute values of bias are not critical magnitude of negative and positive values should be held within 1/2 volt.)

Signal Inputs:

Nominal negative logic signal levels required are:

- Logic 1 = 0 volts (operates -4V to +0.4v);
maximum current per bit less than 1 ma.
Logic 0 = +2 volts or open circuit. (Operates +1.0v to +6v max.); no current drawn.

Truth table:

Letter displayed	5-line 16-8-4-2-1	Letter displayed	5-line 16-8-4-2-1
A	0 0 0 0 1	N	0 1 1 1 0
B	0 0 0 1 0	O	0 1 1 1 1
C	0 0 0 1 1	P	1 0 0 0 0
D	0 0 1 0 0	Q	1 0 0 0 1
E	0 0 1 0 1	R	1 0 0 1 0
F	0 0 1 1 0	S	1 0 0 1 1
G	0 0 1 1 1	T	1 0 1 0 0
H	0 1 0 0 0	U	1 0 1 0 1
I	0 1 0 0 1	V	1 0 1 1 0
J	0 1 0 1 0	W	1 0 1 1 1
K	0 1 0 1 1	X	1 1 0 0 0
L	0 1 1 0 0	Y	1 1 0 0 1
M	0 1 1 0 1	Z	1 1 0 1 0

Viewing angle: 80° from normal (160° total angle)

Transition Time: 22 milliseconds*

Characters: Fully-formed conventional style
1/2 inch per military standard
MS33558 (ASG)

Character brilliance: 50 to 70 footlamberts at maximum intensity.

Terminal connections: CTS 1018-2 42 terminal solder-type strip at rear of character generator.

Motor: Nominal 2600 r.p.m. split-phase precision induction equipped with permanently-lubricated type R4 ball bearings loaded very conservatively for life in excess of 200,000 hours.

Strobe tube life expectancy: 5000 hours minimum for 50% reduction in light output. Each tube is pre-aged to eliminate any early-hours failure caused by latent manufacturing defects.

Case: Black matte finish 3-1/8" high x 8-3/4" deep. Width 5-1/2" for EM3, 8-1/4" for EM4 series.

Weights: For EM3 series 6.0 lbs. actual, 7.5 lbs. approximate packed for shipment.

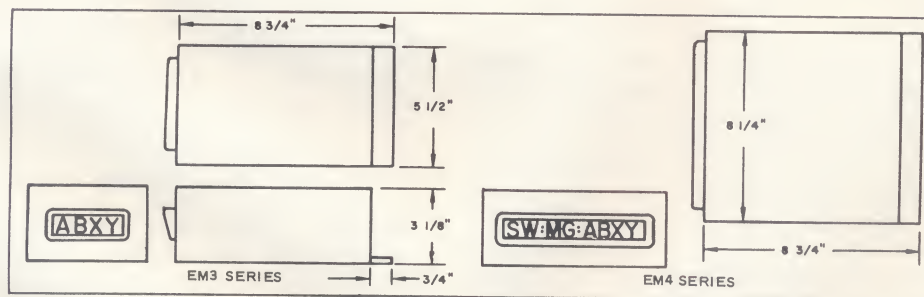
For EM4 series 7.5 lbs. actual, 9.5 lbs. approximate packed for shipment

*Time required to go from one complete display to the next display.

Note: Inputs may be switched at megacycle rates without limitation by Datastrobe unit.

WARRANTY

In general, Datastrobe Digital Display Devices carry a 1-year warranty against defects in material and workmanship, except for the flash tube. Devices proving to be defective within the warranty period will be repaired or replaced. This warranty is exclusive, and in no event will Raytheon be responsible for special or consequential damages. Details of this warranty accompany the equipment.



OPTIONS AND ACCESSORIES

- Letter sizes 1/4, 3/8, 5/8, 3/4 and 1 inch in height
- Positive logic input capability
- Memory: integral high-speed electronic memory
- Flash tube power supply
- High-contrast viewing screen
- Wide-angle viewing screen
- Projection model for console mounting (supplied less bezel and screen but including protective enclosure)

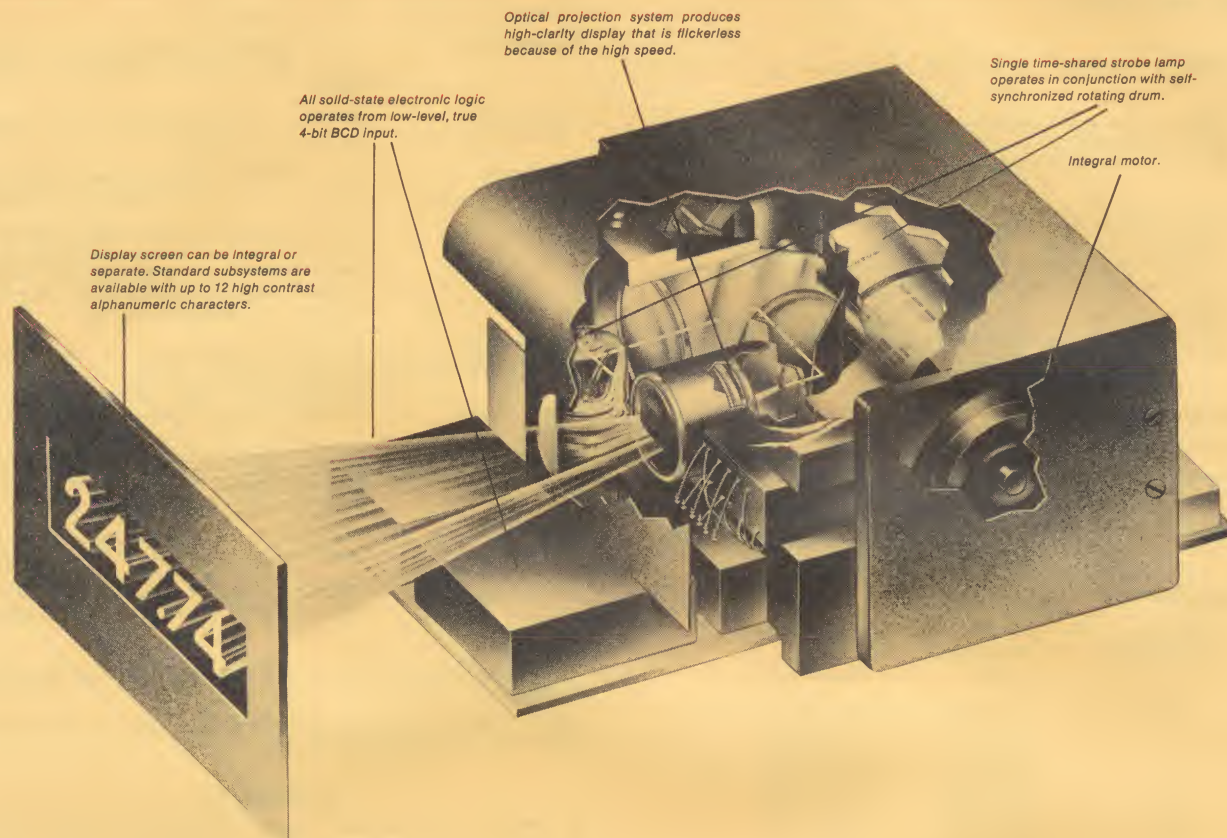
SPECIAL ORDER ITEMS

- Displays less than 1/4 and greater than 1 inch in height
- Numerals or symbols in place of letters
- Custom style letters
- Other digital codes
- Mating connector for quick disconnect
- Grouping and displacement of display columns
- 50 c.p.s. and special voltage motors

PRODUCT SPECIFICATIONS

RAYTHEON

DATASTROBE NUMERICAL READOUT, SERIES EM1 AND EM2



Raytheon's Datastrobe subsystem displays in-line, in-plane, white-on-black numerals of high contrast. Utilizing a new concept for digital readout, a high standard of reliability is attained at low cost.

The Datastrobe character generator uses a single time-shared high-speed Xenon strobe flash tube, in conjunction with an optical system and a character mask affixed to a self-synchronized rotating cylinder, to produce a high-clarity, steady display having precise registration. The all-solid-state electronic logic operates from low-level, true 4-bit BCD code that does not require complementary input. A time-shared, self-decoding method, which uses direct-comparison logic, excludes any possibility of ambiguous readout.

The self-contained Datastrobe system, except for power supply, is complete; it wires directly to logic without buffers or drivers. The display screen, normally integral, can be mounted separately for console use, thus requiring the least panel space of any readout. While $\frac{1}{2}$ inch numerals are normally supplied, numerals of any size up to 1 inch high are available.

The time-sharing feature enhances overall system reliability by reducing the number of components. For example, one six-digit Datastrobe subsystem with floating decimal point eliminates 66 incandescent bulbs, as used in rear projection display devices, plus associated driver circuitry. Since the failure mode of Xenon strobe lamp in the Datastrobe unit is a gradual reduction of intensity as the envelope darkens, replacement can be anticipated. There is no filament to burnout.

Standard Datastrobe numerical readouts are available in two series: the EM1 series capable of display up to six digits, and the EM2 series from 7 to 12 digits. The EM2 series has a second strobe lamp, character mask, and optical system which in effect is paralleled to those of the EM1.

MODEL IDENTIFICATION

EM1-4	4 digits	EM2-8	8 digits
EM1-5	5 digits	EM2-9	9 digits
EM1-6	6 digits	EM2-10	10 digits
EM2-7	7 digits	EM2-11	11 digits
		EM2-12	12 digits

Add suffix D to denote floating decimal point

SPECIFICATIONS

Power requirements:

1. Motor: nominal 115 volts, 60 c.p.s. at 7 watts.
2. Flash tube and trigger circuit: 300 to 400 dc volts max., variable for control of brilliance. 40 mA dc max. for EM1 series, 80 mA dc max. for EM2 series.
3. Bias (regulated supply): +11 to +13 Vdc at 50 mA dc nominal for EM1, at 100 mA dc nominal for EM2. -11 to -13 Vdc at 30 mA dc nominal for EM1 series, at 60 mA dc nominal for EM2 series.

(While absolute values of bias are not critical, magnitude of negative and positive values should be held within 1/2 volt.)

Signal Inputs:

Nominal negative logic signal levels required are:

Logic 1 = 0 volts (maximum -4v to +0.4v); maximum current per bit less than 1 ma.

Logic 0 = +2 volts or open circuit. (Operates +1.0v to +6v max.); no current drawn.

Truth table:

Number Displayed	4-line 8-4-2-1 BCD	2-Out-of-5 Code (optional)
0	0 0 0 0	0 1 0 0 1
1	0 0 0 1	1 1 0 0 0
2	0 0 1 0	1 0 1 0 0
3	0 0 1 1	0 1 1 0 0
4	0 1 0 0	0 1 0 1 0
5	0 1 0 1	0 0 1 1 0
6	0 1 1 0	0 0 1 0 1
7	0 1 1 1	0 0 0 1 1
8	1 0 0 0	1 0 0 1 0
9	1 0 0 1	1 0 0 0 1

Transition Time: 22 milliseconds*

Characters: Fully-formed conventional style 1/2 inch per military standard MS33558 (ASG)

Character brilliance: 50 to 70 footlamberts at maximum intensity setting.

Terminal connections: CTS 1018-2 42 terminal solder-type strip at rear of character generator.

Motor: Nominal 2600 r.p.m. split-phase precision induction equipped with permanently-lubricated type R4 ball bearings loaded very conservatively for life in excess of 200,000 hours.

Strobe tube life expectancy: 5000 hours minimum for 50% reduction in light output. Each tube is pre-aged to eliminate any early-hours failure caused by latent manufacturing defects.

Case: Black matte finish 3-1/8" high x 8-3/4" deep. Width 5-1/2" for EM1, 8-1/4" for EM2 series.

Weights: For EM1 series 6.0 lbs. actual, 7.5 lbs. approximate packed for shipment.

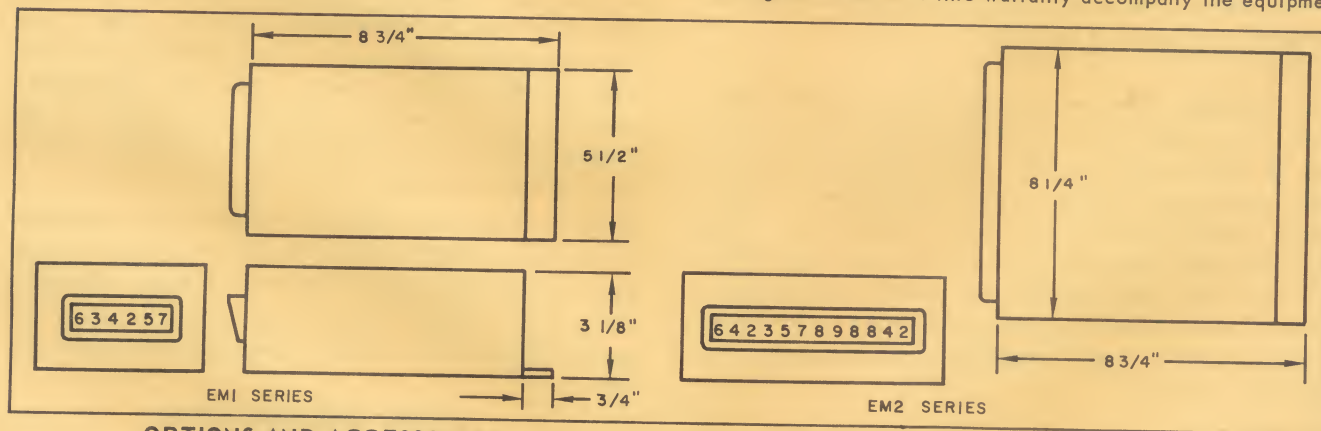
For EM2 series 7.5 lbs. actual, 9.5 lbs. approximate packed for shipment.

*Time required to go from one complete display to the next display.

Note: Inputs may be switched at megacycle rates without limitation by Datastrobe unit.

WARRANTY

In general, Datastrobe Digital Display Devices carry a 1-year warranty against defects in material and workmanship, except for the flash tube. Devices proving to be defective within the warranty period will be repaired or replaced. This warranty is exclusive, and in no event will Raytheon be responsible for special or consequential damages. Details of this warranty accompany the equipment.



OPTIONS AND ACCESSORIES

- Floating decimal point
- Fixed decimal point
- Numerical sizes 1/4, 3/8, 5/8, 3/4 and 1 inch in height
- Positive logic input capability
- Memory: integral high-speed electronic memory
- 2-out-of-5 code, 1-2-2-4 BCD
- Flash tube power supply
- High-contrast viewing screen
- Wide-angle viewing screen

Projection model for console mounting (supplied less bezel and screen but including protective enclosure)

SPECIAL ORDER ITEMS

- Displays less than 1/4 and greater than 1 inch in height
- Characters or symbols in place of numerals
- Custom style numerals
- Baudot and other digital codes
- Mating connector for quick disconnect
- Grouping and displacement of display columns
- 50 c.p.s. and special voltage motors

STANDARD COMMERCIAL STRAIGHT-LINE PROJECTION MODELS

<u>MODEL NUMBER</u>	<u>NO. OF DIGITS</u>	<u>1 to 4</u>	<u>5 to 14*</u>
<u>WITHOUT DECIMAL POINT</u>			
EM1-4	4	\$400.00	\$380.00
EM1-5	5	410.00	390.00
EM1-6	6	450.00	425.00
EM2-7	7	525.00	500.00
EM2-8	8	600.00	570.00
EM2-9	9	675.00	640.00
EM2-10	10	740.00	700.00
EM2-11	11	790.00	750.00
EM2-12	12	840.00	780.00
<u>WITH FLOATING DECIMAL POINT</u>			
EM1-4D	4	\$420.00	\$399.00
EM1-5D	5	430.50	409.50
EM1-6D	6	472.50	446.25
EM2-7D	7	551.25	525.00
EM2-8D	8	630.00	598.50
EM2-9D	9	708.75	672.00
EM2-10D	10	777.00	735.00
EM2-11D	11	829.50	787.50
EM2-12D	12	882.00	819.00

*For pricing and delivery of specific quantities in excess of above, please contact your nearest Raytheon Regional Sales Office.

SPECIAL ORDERS & STANDARD OPTIONS:

When inquiring, please refer to the basic standard model and specify both features desired and the specific quantity (ies) for which quotation is desired.

All orders accepted according to most current Raytheon Components Division terms and conditions of sale.

Terms: Net 30 days.

Transportation: F.O.B. Quincy, Massachusetts.

Inspection: At point of manufacture, Quincy, Massachusetts.

All prices subject to change without notice.

RAYTHEON COMPANY
COMPONENTS DIVISION
INDUSTRIAL COMPONENTS OPERATION
REGIONAL SALES OFFICES

CALIFORNIA

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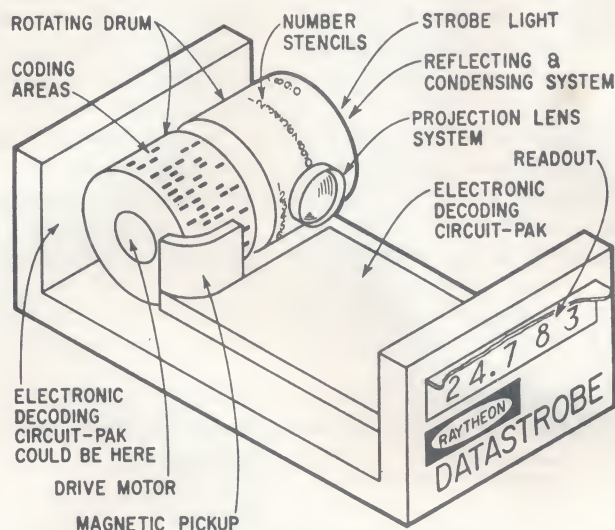
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Now an electronic use of the strobe: display



First production model of the Datastrobe has two rotating drums mounted on a single shaft and turning at 2,500 revolutions per minute. The coding columns are on one drum and the readout characters etched into the other.

The stroboscope, or speedlight, can make whirring gears and turbine blades stand still for inspection. Now the Raytheon Co. is using the same techniques to generate flickerless displays.

Fewer components, low operating power and high reliability are the result of coupling the stroboscopic principle with time-sharing of electronic circuits in the Datastrobe, a new readout device.

The company also sees advantages of simplicity and versatility over other projection readouts and over glow discharge, electroluminescent, electro-mechanical and edgelighted displays. Datastrobe needs no amplifiers, switches, relays or other mechanical devices for intermittent motion. Any type of character or symbol can be etched into the drum. The optics permits printout, including microfilming.

Last fall, Raytheon bought from Norman J. Appleton, a New Jersey inventor, the rights to his stroboscopic readout device. Six months and many market-research hours later, the company will show the first production model at the IEEE show. Some of the engineering has been simplified, but the device is basically the same. Appleton has joined Raytheon and is helping to develop a series of Datastrobes, some with memory and printout features.

Datastrobe uses rotating drums, a xenon flash lamp; all-solid-state circuits; and an optical projection system, to produce a high-contrast, white-on-black multidigit display from binary coded decimal (BCD) input signals.

The flash tube is surrounded by a continuously rotating cylinder, which has transparent characters on it. The tube replaces as many as 66 incandescent bulbs in conventional project displays.

The readout operates directly from the four-bit BCD input, using a one-volt signal and four milliamps per bit. The basic device can be modified to give full alphanumeric or other symbols in any number of columns. In the first production model, the numbers will be five-eighths of an inch high.

Datastrobe's time-shared, all-solid-state logic reduces the number of components. This means increased reliability at lower cost, according to Raytheon's engineers. The decoding system works so that either the correct readout is given or the device fails. "Erroneous readouts are virtually impossible," says a Raytheon design engineer.

In the first production model, two drums are used, one with coding and the other with six columns of characters etched into it. Both drums are mounted on the same shaft, and rotate at 2,500 rpm.

The basic Datastrobe accepts up to six columns of parallel, four-bit BCD information directly from the user's output. This information is serialized by the gating logic, actuated by signals from its drum column pickup. As each column comes to the proper position, the corresponding four bits are supplied to the single decoder-comparator circuit. When the desired number is in the viewing area, a trigger pulse from this circuit fires the flash tube. Because of the high scanning rate, the six-digit presentation appears on the screen in parallel as a sharp, high-contrast, flickerless display. The decoder in the

first model uses a reluctance type pickup of voltages in an 8-4-2-1 code.

The time-sharing principle permits low voltage, low current operation. A six-column readout has a maximum of four bits energized at any one time. This time-sharing of a single tube and single decoding logic circuit over all six character-columns reportedly gives advantages in reliability and economics over systems which require a separate decoding matrix per column or a separate strobe tube per column.

The rotating drums, Datastrobe's only mechanical moving parts, require no close speed control, the logic being self-synchronizing. No brushes or rubbing contacts are used, and no gears. The six-digit display is expandable to 12 by putting two drums on a single shaft.

"Everyone seems to want digital readouts today," commented Niles P. Gowell after extensive

market research. "It's just a matter of economics and device engineering." The Datastrobe inherently lends itself to customizing, so prices will vary greatly. A basic Datastrobe, without accessories or special features such as memory, is expected to sell for \$50 to \$60 per character available for readout. Gowell, who is special programs manager for Raytheon's component division, sees the Datastrobe as competitive with any readout device of three digits or more. "The more digits, the more competitive we are," says Gowell.

Applications are being explored in radar range readout, industrial process control, flight control displays, and navigation system readouts. Datastrobe is considered specially attractive for on-the-bridge displays aboard automated ships. Only four bits per digit are required for input, and this significantly reduces the number of wires needed from remote data points.

Specifications

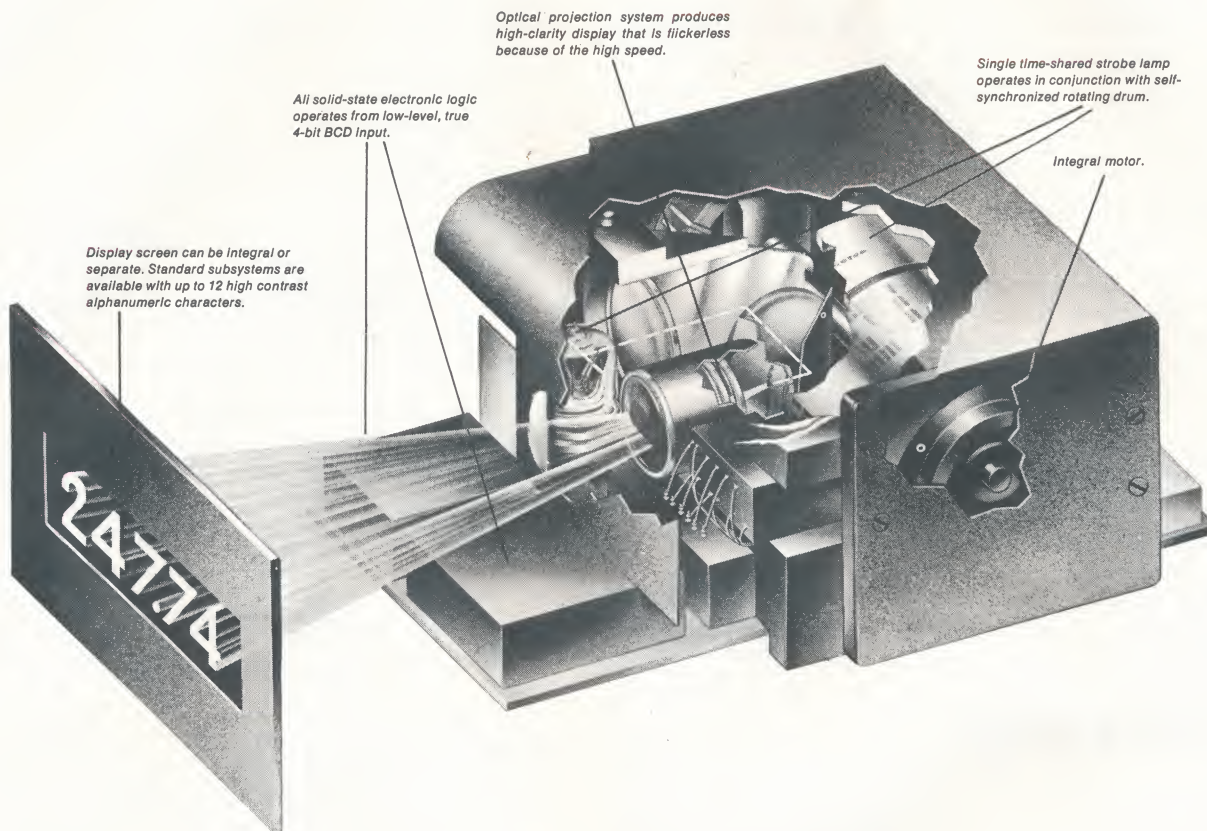
Speed of drum:	2500 rpm
Presentations per second:	45
Input:	110 v 60 cps.
Character height:	Typically $\frac{5}{8}$ "
Number of digits in display:	5 to 50
Lamp power:	A few watts
Motor power:	A few watts
Over-all dimensions:	9" x 5" x 3" high
Required input:	4 bit BCD
Estimated price:	\$50-\$60 per readout character
Floating decimal point availability	



RAYTHEON

Datastrobe*

DIGITAL READOUT SUB-SYSTEM



FEATURES

- **CHARACTERS**
Sharp — Clear
Conventional Shape
White on Black
One Plane
Sizes 1/4 inch to 1 inch
- **ALL SOLID STATE ELECTRONICS**
- **NO AMPLIFIERS REQUIRED**
- **TRUE 4-BIT BCD INPUT**
- **NO DECODERS REQUIRED**
- **FLOATING DECIMAL POINT (optional)**
- **TIME-SHARED SELF SYNCHRONIZED ELECTRONICS**
- **ALPHANUMERIC CAPABILITY**
- **IDEAL REMOTE READOUT CAPABILITY**

DESCRIPTION

The Datastrobe system is based on an entirely new principle which makes possible complete multidigit, in line, in plane, readout systems utilizing a minimum number of components.

The Datastrobe system represents a major breakthrough in the character display field. The single, time-shared, high speed gas strobe tube, encompassed by a continuously rotating cylinder with transparent numbers, replaces as many as 66 incandescent bulbs used in conventional projection displays. An optical system projects brilliant white numbers on the viewing screen against a black background. The unit operates directly from 4 bit BCD input using 2 volt signal and 1 milliamp per bit. Systems can be supplied to provide symbols and full alphanumeric in any number of columns.

Datastrobe's unique, time-shared, all solid state logic, with its low component count, assures maximum system reliability at minimum cost. Switching is faster than the response time of the human eye. In some systems this factor has resulted in the replacement of as many as 10 mechanical type readouts by a single Datastrobe.

SPECIFICATIONS

- Power: 1. Single Phase, 60 cps, 117 Vac, 7 watts
 2. 300-420 Vdc variable (40 mAdc — for 6 digits) (for Flash Tube)
 3. Bias +12 Vdc (50 mAdc max for 6 digits)
 Bias —12 Vdc (30 mAdc max for 6 digits)

Maximum Transition Time: *22 milliseconds

*Time to go from one 6 digit display to a second digit display. Note: inputs may be switched at megacycle rates without limitation by the Datastrobe unit.

Character Height: 1/4 inch to 1 inch

Nominal Dimensions: Height — 3 inches
 Width — 5 1/8 inches
 (4 to 6 digits)

Depth is dependent upon viewing system and character size. For straight projection with 1/2 inch characters, depth is approximately 9 1/4 inches.

MAXIMUM EASE OF INSTALLATION

For a 6 digit unit simply connect 24 parallel outputs (4 bits per digit $\times$ 6) to the Datastrobe inputs. Connect the 400 V flash tube and trigger power lines; connect single ground and ± 12 V bias lines, and 117 V, 60 cycle line to motor. Throw the switch and the Datastrobe is in operation.

PRINCIPLE OF OPERATION

The Datastrobe readout utilizes a single rotating drum in conjunction with a special high speed strobe lamp; time shared, all solid state circuits; and an optical projection system to produce a high clarity, white on black multi-digit display from BCD input signals.

In operation the drum, which has up to 6 columns of characters inscribed on it for each flash tube projection station (see Fig. 1), is rotated continuously at 2500 RPM. The standard Datastrobe accepts up to six columns of parallel, 4 bit BCD information directly

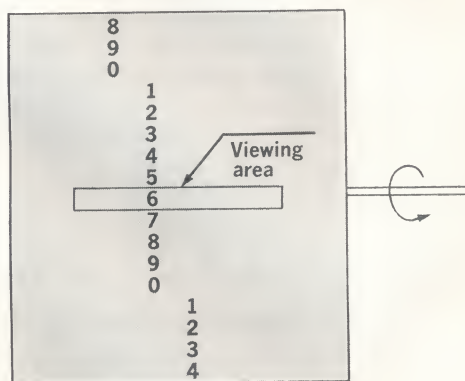


Fig. 1. Character Drum

from the user's output (see Fig. 2). This information is serialized by the Datastrobe's gating logic, actuated by signals from its drum column pickup. As each column comes to the proper position the corresponding 4 bits are supplied to the single decoder-comparator circuit. When the desired number is in the viewing area, a trigger pulse from this circuit fires the single time-shared high speed strobe tube. Due to persistence of vision and the high scanning rate, the complete 6 digit number appears on the screen in parallel as a fixed sharp high contrast flickerless display.

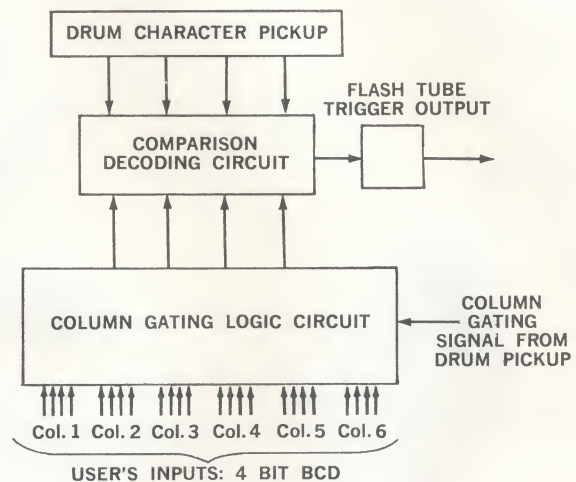


Fig. 2. Datastrobe Logic

ALL SOLID STATE LOGIC CIRCUITS

The Datastrobe readout has all solid state electronics. No switches, no relays, no slide plates nor other intermittent motion mechanisms are used. No auxiliary decoders, no inverters, no amplifiers nor set pulse signals are required.

LOWEST SIGNAL POWER

Negative logic signal levels required from the user's equipment, for the standard Datastrobe readout unit are 1 = 0V, 0 = +2V to +3 1/2 V or open circuit. (For a 1 input (0V), maximum current per bit is less than 1 ma when operating with ± 12 V bias. At 0 (positive V) no current is drawn. As a result of Datastrobe's unique time sharing principle, a six column readout has a maximum of only 4 bits energized at any one time. Positive logic modules are also available.

SPECIAL SYSTEMS

Full Alphanumeric displays are available on special order. Symbols as well as characters may be displayed. For production quantities substantial economies in circuitry used in conjunction with present readout systems are possible through use of special Datastrobe units designed for optimum integration with customer units. Inquiries are invited.

RELIABILITY

Reliability is an inherent characteristic of the Datastrobe, because of the simplicity of the systems concept. The reliability is enhanced by conservative design, careful selection of quality components, conservative component application, and a moderate environment. Further, since Raytheon is one of the most experienced quality control organizations in the electronics industry, manufacturing procedures are strictly adhered to, assuring on-spec performance.

The concept of the system requires a small number of components. A single high speed xenon flash tube is time shared over six decades of characters. This single tube replaces either sixty-six incandescent lamps used in an equivalent conventional projection or edge lighted system, or six numeric display tubes of the gas discharge type. Also, the failure mode of the xenon tube is a gradual diminishing of intensity rather than a catastrophic filament burnout, as in the incandescent type.

An important result of the time shared logic is a major reduction in the number of electronic components. Typically, a six digit Datastrobe will have less than one half the number of transistors, diodes, and resistors required for decoding and driving by other systems.

Also there is a reduction in hardware components, connectors, and sockets. Problems of contact wear, corrosion, and breakage are negligible.

The simplicity of the optical system guarantees trouble free performance. Compared with other types of projection systems, alignment and uniformity of illumination over all numerals does not change with time. This is attributable to use of a single stable glass optical system rather than a multiple plastic lens type.

Rotating components for the character generator incorporate the years of experience and knowledge gained in successful computer drum memory applications. This experience, coupled with conservative application, will deliver well in excess of 10,000 hours performance.

NOTES ON INSTALLATION

The Datastrobe system is broken into three modules, two of which are always required, one of which may be part of a customer's equipment. These modules are (1) character generator, (2) electronics logic and (3) the viewing screen unit. The front illustration shows the complete system, consisting of all three of these units assembled. However, the breakdown into the three modules permits a great flexibility in installation and integration in customer equipment. Figure 3 shows the outline dimension of the character generator which is identical for 4 to 6 digits. Figure 4 displays a model which covers 7 to 12 digits. Figures 5 through 8 show various arrangements for the viewing screen unit.

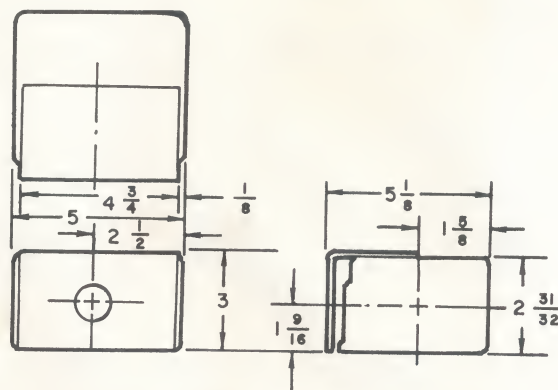


Fig. 3. Character Generator Module. 4-6 Digits.

Figure 5 shows the outline of the direct rear projection screen system. The length dimension will vary somewhat with character size.

Figures 6 and 7 show outlines of mirror foldback projection systems. The mirror foldback system essentially permits a reduction of the length needed to project the given size number by folding the optical path back on itself, thus reducing the overall length by a significant factor. The foldback-forward-reflecting system is unique in that it provides extremely wide angle viewing and very high optical efficiency, whereas wide angle viewing in a rear projection screen is obtained at the expense of attenuation. The forward projection screen, which is basically a lenticular silver-gray motion picture screen, eliminates the transmission loss associated with the rear projection screen, since it operates by reflection of the light. The lenticular formation of the screen surface provides the wide angle capability. This screen is also adjustable, permitting reading at longer distances by optimizing the reflection to coincide with the viewing at that distance.

Placement of the electronics module is relatively arbitrary, and adds to the total flexibility of the system. This module may be placed behind, on top, below or alongside of the unit, as in Figure 8.

Where the customer installation is in a console which is well shielded internally from external light, and where the space permits such mounting, the projection screen module may be eliminated. In such case the projection screen and bezel may be mounted directly in the front panel of the customer's console and the rest of the unit mounted at the rear of the console, as in Figure 9. The only space required at the panel itself then, is a space equal to the size of the numbers to be viewed and a clear channel for the projection of the light between the character generator module and the panel.

These modifications are typical of the Datastrobe's versatility. Many variations can be devised to suit special requirements.

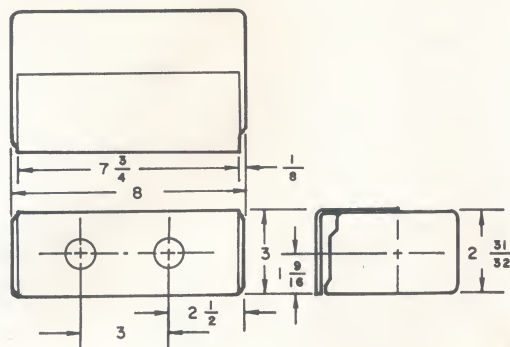


Fig. 4. Character Generator Module 7-12 Digits.

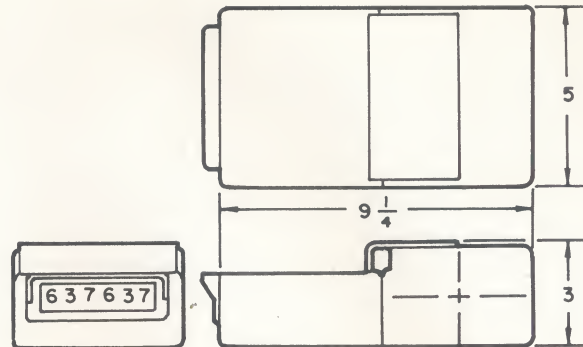


Fig. 5. Complete system with straight line, rear projection viewing scheme.

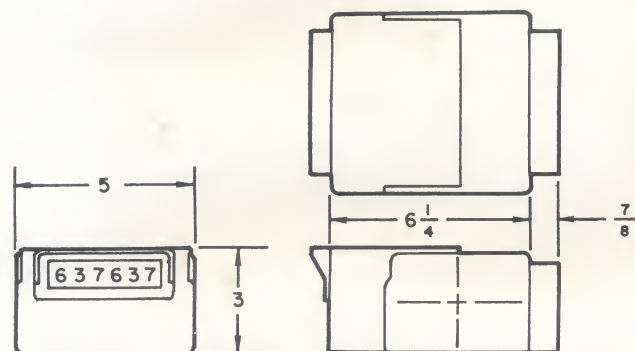


Fig. 6. Complete system with two-mirror foldback optics, rear projection system.

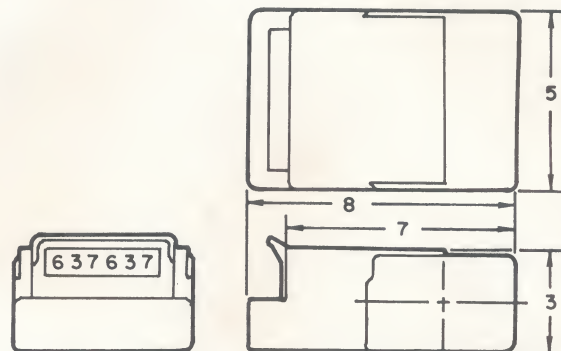


Fig. 7. Complete system with one-mirror foldback optics, front projection system.

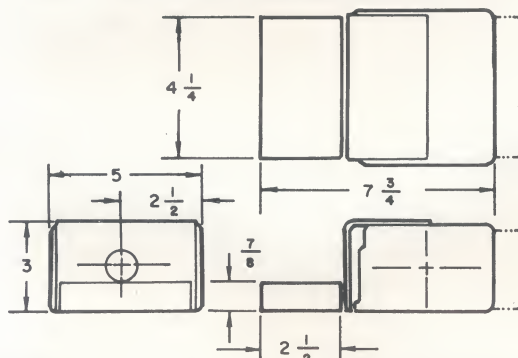


Fig. 8. Character generator and electronics logic module, showing alternate placements.

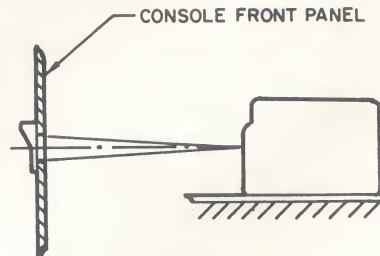


Fig. 9. Console mounting equivalent to straight line optics, standard model.

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